REMARKS

Claims 28, 29, 33-38 and 40-52 are pending. Claims 28, 29, 33, 36, 38, 41, 44, and 48-52 have been amended. Claims 1-27, 30-32 and 39 were cancelled. No new claims have been added. No new matter has been added by virtue of the amendments, support being found throughout the specification and claims as originally filed.

Specifically, support for the amendments to the claims, in particular claim 28 and claim 29 can be found throughout the specification, for example at paragraph [0104]. Support for the amendment to claim 50 can be found at paragraph [0191] of the published application.

Objections

Drawings

The Examiner has objected to the Drawings filed on October 8, 2003.

Applicants herein submit replacement drawing sheets to address the Examiner's objection. Thus, Applicants respectfully request withdrawal of the objection to the drawings.

Oath/ Declaration

The Examiner alleges that "it does not state that the person making the oath or declaration acknowledges the duty to disclose to the Office all information known to the person to be material to patentability as defined in 37 CFR 1.56." (Office Action, p.2). .

Applicants herewith submit a corrected oath and request withdrawal of the objection.

Claim Objections

The Examiner has objected to claim 50. The Examiner alleges that "no method step exists within the claim (and) the claim is also written in narrative form." (Office Action, p.2).

Applicants have amended the claim to address the rejection and respectfully request withdrawal of the objection.

Claim Rejections

35 U.S.C. §112, second paragraph

The Examiner has rejected claim 51 under 35 U.S.C. §112, second paragraph, as being indefinite. The Examiner argues that "(c)laim 51 is dependent on cancelled claim 1." (Office Action, p.3).

Applicants have amended claim 50 to recite the proper dependency. Applicants respectfully request that the rejection be withdrawn.

35 U.S.C. §102(b)

Claim 28 was rejected under 35 U.S.C. 102(b) as being anticipated by Call et al. (US 5,533,256; the '256 reference herein). Applicants respectfully traverse the rejection.

Instant claim 28 recites a system comprising a macroscale device which is interfaced with a microfluidic device using double-sided tape to form a stable association between the microfluidic device and the macroscale device, wherein the double sided tape comprises a first adhesive surface which associates with the macroscale device and a second adhesive surface which associates with the microfluidic device, wherein the microfluidic device has at least one microchannel comprising a fluid stream.

In order to anticipate a claim, each and every element of the claim must be found in a single reference. This is discussed in the Manual of Patent Examining Procedure, § 2131.

The '256 reference does not anticipate the invention as claimed. In particular, the '256 reference nowhere teaches or suggests a microfluidic device let alone a system comprising a macroscale device which is interfaced with a microfluidic device using double-sided tape to form a stable association between the microfluidic device and the macroscale device, wherein the microfluidic device has at least one microchannel comprising a fluid stream.

The Examiner argues that the '256 reference teaches "a macroscale…device which is interfaced with a microscale device using double-sided tape. (Office Action, p.3). The Examiner argues that the '256 reference teaches that "the microscale device has at least one microchannel." The Examiner argues that "the connection of the chip to the motherboard is seen as the microchannel which carries electrons." (Office Action, p.4).

The '256 reference is directed to methods to increase performance and reliability of semiconductor devices, and in particular, to methods of providing the "shortest and most efficient thermal cooling path for the integrated chip circuits." (col 1; lines 43 – 45). Accordingly, the '256 reference is directed to an apparatus and method for joining a chip to a heat sink. The '256 reference discloses a double sided, pressure-sensitive, thermally conductive adhesive tape to directly attach the chip to the heat sink and provide a secure thermal contact between the two. Nowhere in the '256 reference is there teaching or suggestion that the apparatus comprises a microfluidic device, where the microfluidic device has at least one microchannel suitable for a fluid stream, as the '256 reference is directed to microchips.

The Examiner argues that the '256 reference teaches at col 5, lines 18 – 28, a microchannel (Office Action, p.4); however Applicants direct the Examiner to Figure 3, below, and the description in the text at col. 5, line 18.

FIG. 3

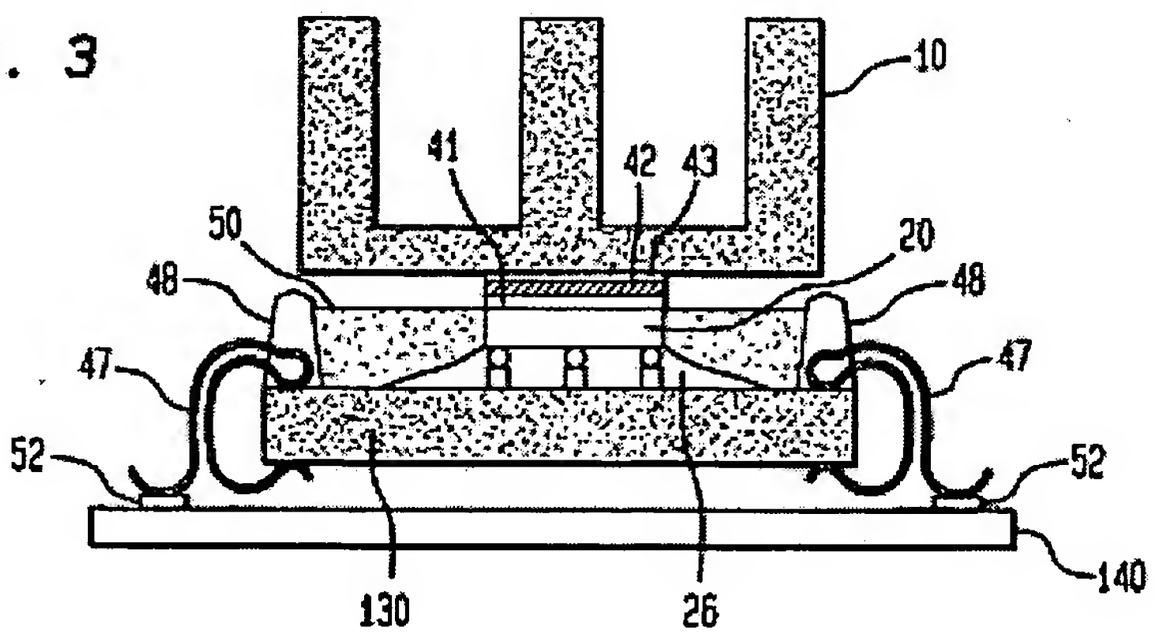

FIG. 3, illustrates another preferred embodiment of this invention, where the chip 20, is on a substrate 130, that is connected to a card or mother board 140. Before the chip 20, is secured to the heat sink 10, via the double-sided,

> pressure-sensitive, thermally-conductive, adhesive tape 42, it has been found that for some applications it is better to encapsulate a portion of the chip 20, the substrate 130, the first encapsulant 26, with a second encapsulant 50. In order to ensure that the second encapsulant 50, does not run over the edges of the substrate 130, one could have dams 48, such as a polymer dam 48.

Nowhere in the figure or description is there teaching or suggestion that the microscale device, which the Examiner argues is the chip (20), has at least one microchannel comprising a fluid stream.

Accordingly, Applicants request withdrawal of the rejection and allowance of the claims.

35 U.S.C. §102(e)

Claim 52 was rejected under 35 U.S.C. 102(e) as being anticipated by O'Connor et al. (US 6,536,477; the '477 reference herein). Applicants respectfully traverse the rejection.

Instant claim 52 recites a system comprising a pump head device which is interfaced with a microfluidic device using double-sided tape to form a stable association between the microfluidic device and the pump head device, wherein the double sided tape comprises a first adhesive surface which associates with the pump head device and a second adhesive surface which associates with the microfluidic device, and wherein a pressure chamber is between the pump head device and the microfluidic device, and the microfluidic device comprises a plurality of microchannels.

As discussed above, in order to anticipate a claim, each and every element of the claim must be found in a single reference.

The Examiner argues that the '477 reference teaches "a system comprising a pump head device...which is interfaced with a microfluidic using double-sided tape (22) to form a stable association between the microfluidic device and the pump head device, wherein the double sided tape comprises a first adhesive surface which associates with the pump head device and a second adhesive surface which associates with the microfluidic device, and

wherein a pressure chamber (48) is between the pump head device and the microfluidic device as shown in figure 2A." (Office Action, p.4).

The '477 reference discloses microfluidic coupling devices that are capable of connecting more than one microfluidic module together to form a larger, integrated system. The '477 reference simply teaches **microfluidic coupling devices and modular systems of microfluidic components** (see e.g. col 1, lns. 61 – 66; col 3, lns. 11 - 14). Applicants point out Figures 1 – 5, all of which teach microfluidic coupling devices (inlet port coupled to an outlet port of a microfluidic device). At best, the '477 reference teaches the use of adhesive to interface one microfluidic device with another microfluidic device via an inlet and an outlet, for example at col 5, lines 14 – 21:

> In a preferred embodiment, the bottom surface 28 of the microfluidic coupler near the inlet port 25 is covered with an adhesive material that allows the inlet port to be connected to the outlet port of a microfluidic device. Alternatively, the surface 28 can be non-adhesive and the surface of the microfluidic device to be coupled to can be adhesive. In an alternative embodiment, both surfaces are adhesive.

However, the '477 reference does not teach use of a **double-sided tape to form a stable association between a microfluidic device and a pump head device** as taught by the instant invention.

Moreover, the '477 reference provides no teaching or motivation to couple the microfluidic device with any pump head device with a double-sided tape. The microfluidic devices taught by the '477 reference are not coupled to a pump head/macroscale device, let alone in a manner according to the instant invention, but rather are only used within the **modular** microfluidic systems. The Examiner points out that at col 7, lines 36 – 65, the '477 reference teaches a syringe pump that is interfaced with a microfliudic device.

> In operation, a sample plug is injected at the inlet port 40 using a syringe pump at a constant flow rate. A fluidic impedance 60 is constructed immediately after the inlet to control the initial fluid flow. The fluid then passes into channel 50 and fills the channel until it reaches impedance 62.

However, the syringe pump taught by the '477 reference is an **external syringe pump** that injects the sample into the microfluidic device, and in no way is stably associated with the microfluidic device. Furthermore, the adhesive material refered to in the '477 reference, allowing the coupling of an inlet port of a first microfluidic device to the outlet port of a second microfluidic device, is not taught nor suggested to couple the microfluidic device and the "syringe pump".

For the reasons set forth above, the '477 reference does not render the current claims obvious. Accordingly, Applicants respectfully request withdrawal of the rejection and allowance of the claims.

35 U.S.C. §103

Claims 28 – 33 and 36 – 43 were rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over O'Connor et al. (the '477 reference, as above) in view of Call et al. (the '256 reference, as above). Applicants respectfully traverse the rejection.

Instant claim 28 was described above. Claim 29 recites a system comprising a macroscale device which is interfaced with a microscale device using transfer tape to form a stable association between the microfluidic device having at least one microchannel comprising a fluid stream and the macroscale device, wherein the transfer tape comprises a backing to which an adhesive surface is separably attached and wherein a bond between the adhesive and the backing is weaker than a bond between the adhesive and the macroscale or microscale surface.

The Examiner argues that the '477 reference teaches "a macroscale device…which is interfaced with a microscale device at an interface using double-sided tape, and a macroscale device which is interfaced with a microscale device at an interface using transfer tape " (Office Action, p.5). Applicants disagree.

The '477 reference fails to teach a macroscale device which is interfaced with a microfluidic device using double-sided tape or transfer tape to form a stable association between the microfluidic device and the macroscale device. As discussed above, the

instant specification at paragraph [0159] clearly teaches that the term "stable association" defines the functional interface between the macroscale and the microscale device.

The '477 reference simply teaches microfluidic coupling devices and modular systems of microfluidic components (see e.g. col 1, lns. 61 – 66; col 3, lns. 11 - 14). Figures 1 – 5 all teach microfluidic coupling devices (inlet port coupled to an outlet port of a microfluidic device). As described above, the '477 reference uses adhesive to interface a microfluidic device with another microfluidic device, for example at col 5, lines 14 – 21.

Accordingly, the '477 reference teaches that microfluidic devices can be coupled to other microfluidic devices with an adhesive material on the microfluidic coupler.

The '477 reference provides no teaching or motivation to couple the microfluidic device with a macrofluidic device. In fact, the microfluidic devices taught by the '477 reference are not coupled to a macrofluidic device in a manner according to the instant invention, but rather are only used **with the modular microfluidic systems**. Nowhere in the '477 reference is there motivation or suggestion to adhere a macrofluidic device to the microfluidic module. Nowhere in the '477 reference is it taught or suggested that a microfluidic device would form a stable interface with a macrofluidic device. As pointed out previously, at col 7 the microfluidic device as taught in operation does not include any association between a macrofluidic and microfluidic device, but rather teaches **an external syringe pump** that injects the sample into the microfluidic device.

The '256 reference does not cure the defects of the '477 reference. For the reasons set forth above, the '256 reference nowhere teaches or suggests a system comprising a macroscale device which is interfaced with a microscale/microfluidic device using double-sided tape to form a stable association between the microscale device and the macroscale device, wherein the microscale device has at least one microchannel adapted to contain a fluid stream.

Accordingly, Applicants request withdrawal of the rejection and allowance of the claims.

Claims 28 – 33 and 36 – 43 were rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over O'Connor et al. (the '477 reference, as above) and Call et al. (the

'256 reference, as above) and further in view of Crandall et al. (US 6,352,766; the '766 reference herein). Applicants respectfully traverse the rejection.

The instant claims were described above.

For the reasons set forth above, the '477 reference in combination with the '256 reference does not render the current claims obvious. The addition of the '766 reference does not cure the defects of the '477 reference.

Claims 46 and 47 were rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over O'Connor et al. (the '477 reference, as above) and Call et al. (the '256 reference, as above) and further in view of DiZio et al. (US 6,455,152; the '152 reference herein). Applicants respectfully traverse the rejection.

Claim 46 and 47 depend from claim 28. claim 46 recites where the adhesive on the tape is patterned onto a backing. Claim 47 recites where at least one surface of the tape comprises portions that are coated with adhesive and portions that are not coated with adhesive.

For the reasons set forth above, the '477 reference in combination with the '256 reference does not render the current claims obvious. The addition of the '152 reference does not cure the defects of the '477 reference.

Accordingly, Applicants respectfully request withdrawal of the rejection and allowance of the claims.

Double Patenting

The Examiner argues that if claims 28 and 29 are found allowable, then claims 48 and 49 will be objected to under 37 CFR 1.75 as being a substantial duplicate thereof. The Examiner argues that "when two claims in an application are duplicates or else are so close in content that they both cover the same thing, despite a slight difference in wording, it is proper after allowing one claim to object to the other as being a substantial duplicate of the allowed claim." (Office Action, p.11). Applicants respectfully traverse the rejection.

In the interest of advancing prosecution, should claims 28 and 29 be allowed, applicants would consider amending or cancelling any claims that would be duplicates of the allowed claims under 37 CFR 1.75.

CONCLUSION

In light of the above remarks, Applicants respectfully request early consideration and allowance of the subject application.

Should the Examiner wish to discuss any of the amendments and/or remarks made herein, the undersigned attorney would appreciate the opportunity to do so.

The Commissioner is hereby authorized to charge any fees that may be required, or credit any overpayment to Deposit Account No. 04-1105.

In view of the above amendment, applicant believes the pending application is in condition for allowance.

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Respectfully submitted,

By _____

Jeffrey Kopacz
Registration No.: 54,744
EDWARDS ANGELL PALMER & DODGE LLP
P.O. Box 55874
Boston, Massachusetts 02205
(617) 239-0719
Attorneys/Agents For Applicant